Technical Paper 278

THE PERCEPTION OF TACTICAL INTELLIGENCE INDICATIONS BY INTELLIGENCE OFFICERS

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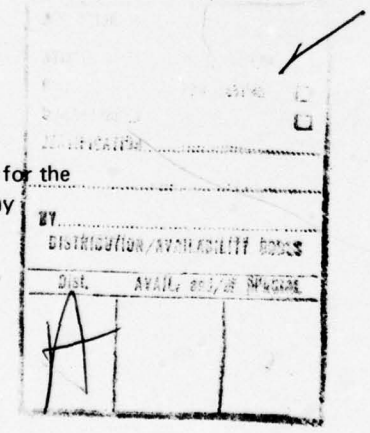

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As part of an effort to provide improved techniques and methods for intelligence collection planning and intelligence analysis, an experiment was conducted to assess the effectiveness of traditional tactical intelligence indications for the analysis of conventional military operations. Forty-six captains in the Intelligence Officers Advanced Course each assumed the role of staff officer in a G-2 section of an Infantry Division conducting a mobile defense in north-central West Germany. Each officer estimated the probability that each of 49 separate indications listed in Field Manual 30-5, Combat

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20. Intelligence, would occur, given the aggressor's known course of action. Each indication was evaluated with four separate courses of action--Attack, Defend, Delay, and Withdraw. Eleven indications were evaluated twice with each course of action to provide an estimate of reliability. Analyses are based on the 44 officers who completed the evaluation. The estimates made by individual officers were highly reliable. However, the variability in the estimates made by different officers for the same indication was extremely high, with an average range of estimates greater than .7 on a 0 to 1.0 scale. Only 19 of the indications were perceived as effective discriminators of the course of action with which they are doctrinally associated. The logic underlying clusters of related indications could not be clearly identified for any of the four courses of action. The findings reveal that current indications of conventional military operations are either poorly understood or intrinsically inadequate for use in contemporary intelligence operations, or both. The experiment was conducted by the Intelligence Information Processing Program of the U.S. Army Research Institute for the Behavioral and Social Sciences.

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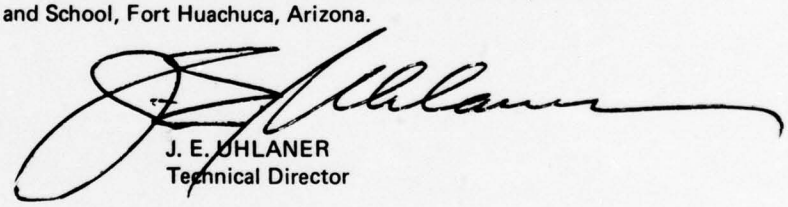
FOREWORD

The Battlefield Information Systems Technical Area of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) does research on tactical information systems--the transformation and organization of battlefield information, and staff aids to battle management in target acquisition, intelligence, and command/control systems--as well as information system resource management, using automated tactical data systems, and the investigation of the kinds of perceptions and thinking necessary for the proper judging of tactical intelligence information. The present report assesses the usefulness of traditional tactical intelligence indications, as identified and interpreted by students in the Intelligence Officers Advanced Course.

Research in this area is conducted as an in-house effort augmented by contracts with organizations selected for their unique capabilities and facilities for research in intelligence systems. The present research was conducted jointly by personnel of ARI and Planning Systems, Inc. of McLean, Virginia, under contract DAHC 19-74-C-0029. The work was done in response to requirements of Army Project 20062101A754 and to the special requirements of the Combined Arms Combat Development Activity (CACDA), Fort Leavenworth, Kansas, with the cooperation of the U.S. Army Intelligence Center and School, Fort Huachuca, Arizona.



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THE PERCEPTION OF TACTICAL INTELLIGENCE INDICATIONS BY INTELLIGENCE OFFICERS

BRIEF

Requirement:

To determine how effectively intelligence officers perceive traditional tactical intelligence indications and use them as a focus for intelligence analysis and as a basis for collection planning.

Procedure:

Forty-six captains in the Intelligence Officers Advanced Course each assumed the role of an intelligence staff officer in a G-2 section of an Infantry Division conducting a mobile defense in north-central West Germany. Each officer estimated the probability that each of 49 indications listed in FM 30-5, Combat Intelligence, would occur, given the aggressor's known course of action. Analyses are based on the 44 officers who completed the experiment. Each indication was evaluated with four separate courses of enemy action--Attack, Defend, Delay, and Withdraw. Eleven indications were evaluated twice with each course of action to provide an estimate of reliability.

Findings:

The estimates of probability made by individual officers were highly reliable.

However, the officers provided greatly differing estimates of the frequency with which they would expect a given indication to be associated with a given course of enemy action. The average range of estimates was greater than .7 on a 0 to 1.0 scale.

At most, 19 of the 49 indications were perceived as effective discriminators of the course of enemy action with which they are doctrinally associated.

The logic underlying clusters of related indications could not be clearly identified for any of the four courses of action.

Utilization of Findings:

The findings reveal that the traditional indications of conventional operations are either poorly understood, intrinsically inadequate for use in contemporary intelligence operations, or both. Accordingly, Intelligence personnel should be extremely cautious in the use or interpretation of current indications. These results suggest at least two areas for improving the identification and utilization of indications: The development of an improved indications structure and the development of baseline data representing the probability of occurrence of specific indications in association with specific courses of enemy action.

THE PERCEPTION OF TACTICAL INTELLIGENCE INDICATIONS BY INTELLIGENCE OFFICERS

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PERCEPTION OF TACTICAL INTELLIGENCE INDICATIONS BY INTELLIGENCE OFFICERS

INTRODUCTION

It is virtually impossible for a military force to conduct operations without some telltale activities. Specific activities must be carried out in preparation for, or in conjunction with, specific operations or courses of action. Some of these activities may be essential to the intended operation, while others may be dictated by the personality of a commander or organizational imperatives. In many cases, these activities can be detected and, in theory, used to deduce the probable courses of action of the opposing military force. Certain activities traditionally associated with given courses of action are known as ''indications.''

The identification and interpretation of the specific indications typically associated with specific courses of military action are critical tasks in the tactical intelligence cycle. Intelligence information is organized around indications in the production of intelligence, and the analysis of indications is the basis for estimates of aggressor capabilities and vulnerabilities. Intelligence requirements are analyzed in terms of indications which by their existence or nonexistence provide an answer to a requirement. These analyses provide the basis for specific orders and requests for information. Thus, indications are a focal point for both the intelligence collection manager and the intelligence analyst in relating specific information to intelligence questions.

The process of identifying the critical activites of a military force which may indicate the existence of a particular enemy capability or vulnerability or the adoption of a particular course of action is called ''Determination of Indications.''[1] In the publication cited, an indication is formally defined as

> ''. . . any positive or negative evidence of enemy activity or any characteristic of the area of operations which points toward enemy vulnerabilities or the adoption or rejection by the enemy of a particular capability, or which may influence the commander's selection of a particular course of action.''

Indications include conditions which may result either from previous actions or from enemy failure to take action. For example, the enemy's logistical situation may appear to favor his use of a particular capability or indicate an enemy vulnerability. Interpretation of the indications may then influence selection of a particular course of action to counteract the expected enemy action.

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[1] Department of the Army Field Manual, FM 30-5, Combat Intelligence, October 1973.

The development of indications requires a thorough knowledge of the enemy, including his organization, equipment, tactical doctrine, command personalities, and logistical methods, and of the characteristics of the area of operations. However, indications are intentionally general in nature--"The chances are that the indications could be written in Washington, D.C., once the EEI and OIR had been announced."[2] Indications are neither abstract events nor specific data items, but rather patterns of specific events or activities that are consequences of conducting military operations. One such pattern is the forward deployment of supply and evacuation installations in preparing to attack.

In the post-World War II period, the U.S. Army developed a set of tactical intelligence indications organized around four general courses of enemy action--Attack, Defend, Delay, and Withdraw--shown in Table 1.[3] Emphasis was placed on conventional military infantry, armor, and artillery activity; activities associated with the use of nuclear weapons and tactical air have since been treated as special cases. These traditional indications are based on lessons learned in World War II and represent a sampling of typical indications. The set is by no means complete, nor is it intended for dogmatic application in all situations. The indications are intended rather as guidelines, as a base from which the intelligence officer can develop indications appropriate to a specific situation. The traditional indications are extensively used for instructional purposes in both tactical intelligence classes and in field problems and war games.

Indications are probabilistic in nature; they represent patterns of activity which could occur whenever the enemy is engaged in any one of the four courses of action. The extent to which an indication is an effective discriminator among the four alternative courses of action depends on differences in the relative frequency of occurrence of an indication with each of the four courses of action. For example, an enemy may deploy his combat elements in echelon on 10% of the occasions on which he does not attack, but on 80% of the occasions when he does attack. This activity is then highly predictive of an attack. However, if an enemy deployed his combat elements in echelon in 70% of the occasions when he did not attack, this activity would not be very predictive of the enemy's course of action.

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[2] U S. Army Intelligence Center and School. Collection planning and management. Supplemental Reading, SUPR 02677/80307, January 1973. EEI (Essential Elements of Information) and OIR (Other Intelligence Requirements) are the two broad categories of command intelligence requirements.

[3] FM 30-5, op.cit.; Department of the Army Field Manual, FM 30-102, Handbook on Aggressor Military Forces, October 1969.

Indications are a powerful tool of the intelligence officer, as evidenced by Koch's[4] use of indications in deducing the nonexistence of an Alpine redoubt in the closing days of World War II. Indications are also the thread which holds together collection planning methods being developed to improve the intelligence process.[5] However, many intelligence officers consider that traditional indications are dated and bear little relationship to contemporary conflict. Indications are also criticized as too generalized in nature for most tactical situations and too specialized as to type of conflict. In view of these problems, the determination of indications is a difficult task.[6] The traditional indications need to be evaluated to determine the validity of these criticisms. However, little data have been developed that can be used to evaluate either these general criticisms or the effectiveness of specific indications.

Evaluations of the traditional indications must be based in part on the judgment of military experts rather than solely on historical data. The desired historical data may be unavailable, of unacceptable quality, or, more important, not representative of future combat operations. Initial evaluation could be based solely on the judgment of intelligence officers. Probability of occurrence of specific indications as perceived by the intelligence officers could be used as a basis for determining if indications are perceived to be effective and, if not, for identifying the probable reasons.

An evaluation based on the perceived probability of occurrence of indications could also be used to identify the network of interrelationships among indications perceived by intelligence officers. Indications are often used in clusters or groups, rarely individually. Thus, indications would be expected to exhibit patterns of intercorrelations which define clusters or groups of related indications associated in a particular way with a given course of enemy action. Ideally, the indications within each cluster should be similar for different courses of action and should vary mainly in terms of the magnitude of their relationship with a course of action. There should be underlying principles such as organizational imperatives which define the relationships among indications and determine their association with courses of action. These relationships and principles should be useful both for instructional purposes and in the development of new indications.

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[4] Koch, O. W., with R. G. Hays. G-2 Intelligence for Patton. Philadelphia: Whitmore Publishing, 1971.

[5] Jaarsma, D., Spooner, R. L., and Johnson, E. M. Methods for planning intelligence collection: Acquisition priorities and resource allocation. ARI Technical Paper, in preparation. (a)

[6] Jaarsma, D., Spooner, R. L., and Johnson, E. M. Initial evaluation of a prototype methodology for planning intelligence collection. ARI Research Memorandum, in preparation. (b)

The purpose of the present analysis was to evaluate the perceived effectiveness of the traditional intelligence indications as a focus for intelligence analysis and as a basis for collection planning. This evaluation had two objectives:

1. To determine the perceived ability of indications to discriminate among alternative enemy courses of action.

2. To identify the underlying dimensions or clusters of indications associated with specific courses of action.

METHOD

SAMPLE

Forty-six captains enrolled in the Intelligence Officers Advanced Course at the U.S. Army Intelligence Center and School, Fort Huachuca, Arizona, participated in the experiment.

EXPERIMENTAL TASK

Each officer was asked to assume the role of an intelligence staff officer in the G-2 section of the 20th U.S. Infantry Division conducting a mobile defense in north-central West Germany near the East/West German border. In that role, he estimated the probability that each of 49 indications would occur, given a known aggressor course of action. Each indication was evaluated relative to four separate courses of aggressor action--Attack, Defend, Delay, Withdraw.

Scenario. A brief scenario was presented in which each of four courses of action was feasible for the Aggressor. The scenario stated that following a coordinated non-nuclear attack into West Germany in July, NATO forces had blunted the attack. By 15 August, the front had become relatively stable. The Aggressor's main penetration was north of the Sauerland. South and east of the Sauerland, NATO forces were in defensive positions east of the Vogelsberg. As of 15 September, the G-2 Intelligence Estimate listed the following Aggressor capabilities:

1. Continue defense along the border area.

2. Attack at any time along the border.

3. Withdraw major elements of the 2d CAA to support operations in the north.

4. Conduct delaying operations along the border while main elements move to defensive positions.

Indications. Forty-nine indications descriptive of enemy activity were selected from FM 30-102, Handbook on Aggressor Military Forces. These included all the indications relating to mid-intensity non-nuclear conflict as well as indications of nuclear operations which were related to non-nuclear operations. By doctrine, 30 of the 49 indications are related to Attack, 15 to Defend, 3 to Delay, and 1 to Withdraw. Two indications of Reinforcement and 4 of Nuclear operations were included in the 30 Attack indications selected.

PROCEDURE

A response booklet was prepared which included the scenario, instructions, and lists of indications. For each course of action, four different pages of 15 indications each were prepared. Eleven indications were listed twice with each course of action. The 60 indications were listed in random order for each course of action. However, a given indication was never listed twice on the same page. The four pages of indications for each Aggressor course of action were assembled in one of 24 possible orderings. Thus, each officer evaluated all the indications relative to one course of action before proceeding to evaluate the indications relative to another course of action. The four-page sets of indications for each of the four courses of action were assembled in one of 24 possible orderings. There were 576 possible unique orderings of indications and courses of action in the response booklets. Each officer evaluated the 16 pages of indications in a different order.

The experiment was conducted in a large classroom in a single session. After the response booklets were handed out, an overview of the experiment was read, and subjects were allowed 10 minutes to become familiar with the scenario. They were then instructed that

> ". . . Your task on the 16 pages of the indications section is to evaluate for each indication listed the probability that it will occur, given the Aggressor is taking the specific course of action listed at the top of the page. These evaluations are to be made in the context of the Meiningen Gap Scenario given in the previous section. You should not concern yourself with the specific details of the scenario. Rather, you should consider it as a general framework within which to make your evaluations.
>
> The way you should think of your assessment is as a probability of occurrence. Since probabilities range from 0 to 1, this is the range of assignments you may use to describe your judgment. This may be confusing, so let's look at a similar type of judgment--weather predicting . . ."

Subjects were instructed to evaluate each indication independently of any other indication, considering only the Aggressor's true course of action, to complete each page before continuing to the following page, and not to refer back to a page once it had been completed. It was stressed that accuracy was more important than speed.[7]

Breaks were allowed as required. Subjects took from 45 to 70 minutes to complete the task and to complete an experience questionnaire.

RESULTS

The basic data were the probabilities of occurrence assigned by each of the officers to each indication, given each of the four courses of action. The analyses below are based on 44 subjects, since two of the 46 failed to complete all the pages in their response booklets. The first question considered is the reliability of the estimates provided by the officers. Analyses of two types are then presented. One, based on analysis of variance, focuses on differences among specific indications. The other, based on product-moment correlation, focuses on the relationships among indications.

RESPONSE RELIABILITY

The 11 indications presented twice with each given course of action were pooled over the four courses of action to provide a total of 44 pairs of estimates by each subject. The mean intrasubject product-moment correlation for the 44 subjects was .77, with a range from .39 to .97 and a standard deviation of .13. These coefficients indicate that individual subjects were quite consistent in their perceptions of the probability of occurrence of specific indications. In subsequent analyses, the mean of a subject's two responses was used for each of the 11 indications repeated within a given course of action.

DIFFERENCES AMONG INDICATIONS

The mean and range of the perceived probability of occurrence of each indication for each course of action are presented in Table 1. (The corresponding standard deviations averaged 20.4, varying from 11.8 to 26.0.) All the indications had a non-zero mean perceived probability of occurrence with each of the four courses of action.

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[7] Other methods are available for eliciting more ''precise'' subjective probability estimates (Huber, G. P. Methods for quantifying subjective probabilities and multi-attribute utilities. Decision Sciences, 1974, 5, 430-458). These methods all require that a consultant work directly with the individual making the estimate. Thus, although not appropriate for the present experiment, they would be appropriate in developing baseline data.

That is, all indications were perceived as feasible, given any of the four courses of action. The inter-subject variability of the estimates was extremely high, with an average range of 79.3. Subjects typically did not use the fine-grain feature of the 100-point scale in making their judgments; of the more than 10,000 separate assessments made by the 44 students, more than 94% were numbers which are multiples of 10 (10, 20, 30 . . .), and 99% were numbers which are multiples of 5 (5, 10, 15 . . .).

An analysis of variance of indications x courses of action revealed significant differences between courses of action ($F(3,129) = 78.8$, $p < .001$), indications ($F(48,2064) = 17.18$, $p < .001$), and a significant indications x courses of action interaction ($F(144,6192) = 35.11$, $p < .001$). Comparisons among the four courses of action averaged over the 49 indications are not very useful, as the concept of an ''average indication'' is not meaningful. Similarly, comparisons among the 49 indications averaged over the four courses of action are not useful, as the concept of an ''average course of action'' is not meaningful. Rather, the comparisons of interest concern the interaction among courses of action for a given indication.

Results of these comparisons made using the Tukey (b) procedure[8] at a .01 level of significance are shown in Table 1. Entries underlined by a common line do not differ significantly from each other; entries not underlined by a common line do differ significantly. Using indication Number 1 as an example, the mean perceived probability of occurrence was significantly higher given Attack than given either Defend, Delay, or Withdraw; and the mean perceived probability of occurrence was not significantly different when given either Defend, Delay, or Withdraw. For a few indications, the pattern of significant differences may not be immediately clear. The complexity results from listing the courses of action in a standard order rather than in terms of an ascending or descending order of mean perceived probability of occurrence. The pattern of significant differences becomes apparent if the mean perceived probability of occurrence associated with each course of action is listed in a descending order as shown below for indication number 18:

Attack	Withdraw	Delay	Defend
73	51	43	30

Here, the mean perceived probability of occurrence was not significantly different between the Aggressor courses of action of Attack and Withdraw, or among Withdraw, Delay, and Defend. However, the indication was perceived

[8] Winer, B. J. Statistical principles in experimental design. New York: McGraw-Hill, 1962.

as significantly more probable if the Aggressor course of action was Attack than if the Aggressor course of action was Delay or Defend.

Results of the comparisons shown in Table 1 can be summarized as follows:

1. For 12 of the 49 indications (7 Attack, 4 Defend, and 1 Delay), there were no significant differences in the mean perceived probability of occurrence among the four courses of action.

2. Seventeen of the 30 indications doctrinally associated with Attack had significantly higher mean perceived probabilities of occurrence given Attack than given any of the remaining three courses of action. These indications are identified by an asterisk (*) in Table 1.

3. Two of the 15 indications doctrinally associated with Defend had significantly higher mean perceived probabilities of occurrence given Defend than given any of the remaining three courses of action. These indications are also identified by as asterisk (*) in Table 1.

4. Neither the 3 indications doctrinally associated with Delay nor the indication of Withdraw had significantly higher mean perceived probabilities of occurrence given Delay or Withdraw, respectively.

The results of the comparison tests imply that the traditional indications are not good discriminators among the four courses of action. Only 19 of the 49 indications (17 Attack and 2 Defend) had a significantly higher mean perceived probability of occurrence given the course of action which they are doctrinally associated. Considering these 19 indications, the perceived probability of occurrence had a range of at least .45 and a mean perceived probability of occurrence of at least .3 with some other course of action. Thus, given an estimate from an individual using one of these 19 ''good'' indications, the Aggressor's course of action is still somewhat ambiguous.

CORRELATIONS AMONG INDICATIONS

None of the indications proved to be unique, nor would one expect them to be--a good reason indications are rarely used individually. This lack of uniqueness suggests that the patterns of intercorrelations between indications may define clusters or groups of related indications associated in a particular way with a given course of action.

The first step in the search for patterns among indications was to compute the intercorrelations among the 49 indications for each course of action. Principal components factor analysis[9] was then used to

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[9] Harman, H. H. Modern factor analysis. Chicago: University of Chicago Press, 1967.

abstract the underlying or implicit dimensions of variation in the assessments of the indications for each course of action. A varimax rotation of the resulting factor structure was performed so that each factor was independent of every other factor, given a course of action. Rotation also has the effect of re-locating factor dimensions so as to spread the between-factor variance more evenly across the separate factors, while maximizing the variance accounted for by the factors, i.e., maximizing the within-factor variance.

The resulting factor structure for each course of action is shown in Tables 2-5. The number of factors and the total percentage of variance accounted for in each of the Aggressor's given courses of action was 14 (81%) given Attack, 14 (80%) given Defend, 15 (81%) given Delay, and 15 (82%) given Withdraw. The absolute value of the factor coefficient of an indication reflects the relative contribution of that indication to a factor. Generally, each indication contributed to all the factors, but predominately to only one. Thus, each indication is listed only with the factor for which its factor coefficient was highest, i.e., the factor with which it was most closely associated. The number of each indication is listed to aid in interpreting the factors. Note that in FM 30-102, indications 1 through 30 are related to Attack, 31 through 45 related to Defend, 46, 47, and 48 are related to Delay, and 49 is related to Withdraw.

The factor structures shown in Tables 2-5 are well defined statistically, and it is clear that indications were not perceived as representing single events of activities, but rather as sets of related events having some over-all structure. The underlying principles by which these clusters of indications are associated are not readily apparent for most factors, but the factors do provide some clues concerning the perceived structure of indications.

First, the factor structure for each course of action consists of many specific weak factors. Second, the indications associated with any given factor generally represent indications associated by doctrine with more than one course of action. Third, each of the four factor structures has from one to three factors containing many indications (more than four), whereas all the remaining factors contain few indications (four or less). This type of factor structure is usually found when the sample contains groups of subjects with different response styles. The sample of students in the Intelligence Officers Advanced Course probably contained several groups of students, each group perceiving indications somewhat differently.

Factor analysis with the sample size used (44) usually yields results which are not very stable. Thus, some of the components (indications) of the factors and some of the factors themselves might change if the analyses were repeated with a different sample from the same general population, in this case students in the Intelligence Officers Advanced Course.

However, these analyses provide clear evidence that current indications of conventional military operations are not perceived within a coherent framework useful for discriminating between alternative courses of action. The analyses also provide some clues as to the perceived structuring of current indications. This structure could be used as a starting point for developing a useful framework within which to organize indications. For instance, indications of defensive preparations such as ''entrenching and erecting bands of wire'' appear to be related to one common factor. However, indications of attack preparations such as ''increased patrolling'' do not appear to be related to one common factor but are divided into several factors.

SUBJECT PROFILE

Given the results concerning indications, it is of some interest to look at the characteristics of the students who participated in this experiment. All were captains with between 1 and 11 years of active duty; the average was 6.3 years. They had from 2 to 6 years of college with an average of 4.2 years. Primary Military Occupational Specialties (PMOS) were varied; there were only two MOS with 5 or more students: 17 Counterintelligence Officers (9666) and 6 Tactical Intelligence Staff Officers (9301). The students were in the fifth month of the Intelligence Officers Advanced Course and had received the block of instruction concerning intelligence collection planning and the use of indications. From post-experiment questionnaires, the students considered themselves familiar with indications. However, most had never used indications in an operational setting.

Correlational techniques were used to examine the influence of background and experience on an individual's assessments of indications. Intercorrelations among the 44 subjects were computed over the 49 indications for each course of action. To abstract the underlying or implicit dimensions of variation among subjects, principal components factor analysis with varimax rotation was performed for each course of action. The resulting factor structures were well defined. However, there was little commonality between the groupings of subjects or factors found for each course of action, and none of the groupings or factors could be related to either primary or secondary MOS, to years of active duty, nor to an individual's rated familiarity with the use of indications. In view of the results of the factor analyses of indications, the students probably could be divided into groupings defined in terms of the interrelationships among their estimates of the indications. Thus, these groupings of students are based on differing interpretations of the indications. However, the underlying parameters along which the groupings can be differentiated could not be identified.

IMPLICATIONS OF THE RESULTS

Results clearly indicate that standard indications of conventional military operations are not uniformly interpreted by students in the Intelligence Officers Advanced Course and hence are likely to be ineffective as the focus of analysis or as the basis for collection planning. Individual evaluations of a given indication were highly reliable, but there was little agreement among individuals concerning the perceived frequency of occurrence of an indication with each of the four courses of action. To the extent that the officers participating in the experiment are representative of the Army's tactical intelligence officers, the standard indications are ineffective discriminators between alternative courses of action.

There are several possible explanations of the results in terms of the operational utilization of indications. The variability in the perceived probability of occurrence was so large that few of the indications were perceived as effective discriminators of the course of action with which they are doctrinally associated. The lack of agreement among intelligence officers concerning the probability of occurrence of specific indications may result from the fact that the indications themselves are not dependably associated with specific courses of action. That is, the variability in the perceived probability of occurrence accurately reflects the relationship between indications and courses of action. If so, then the indications themselves are intrinsically inadequate.

Second, if the indications <u>are</u> effective discriminators between alternative courses of action, then the officers do not possess the requisite knowledge to evaluate indications. Since all students had received the block of instruction in the Intelligence Officers Advanced Course concerning indications and collection planning and were familiar with the ''enemy'' force used in the experiment (FM 30-102), that training is not adequate to evaluate indications.

Third, if it is not feasible to evaluate indications in the context of a brief description of the situation, then the doctrine concerning the generality of indications is misleading. The intentional generality of indications implies that only a brief overview of the general and special situation is required in order to evaluate indications. As stated earlier, the Intelligence Center and School[10] writes that indications could probably be written from the perspective of Washington, D.C. If a more detailed knowledge on an enemy and the situation is actually required in order to evaluate indications, then this doctrine should be reexamined.

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[10] U.S. Army Intelligence Center and School, 1973, op.cit.

Fourth, if it is not feasible to evaluate indications singly, then the only doctrinal basis for grouping indications--in terms of the four courses of action--is inadequate. The complete list of indications doctrinally associated with a course of action would seldom occur in a given situation. However, currently there is no provision for organizing indications according to the dependencies which occur among indications as natural consequences of conducting military operations. For example, the occurrence of ''massing of mechanized elements, tanks, artillery, and logistical support'' in conjunction with ''extensive artillery preparation'' is more diagnostic of Attack than is the occurrence of either indication separately. In the absence of a doctrinal basis for choosing small sets of related indications, the evaluation of single indications may be a close approximation to the process followed by intelligence officers in selecting groups of indications in collection planning or searching for indications in intelligence analysis.

Which of these four alternative explanations, or combination of explanations, best accounts for the results of this experiment is not known. It is apparent that both the doctrine associated with indications and the training in identification and use of indications must be systematically examined, and new or remedial doctrine and training methods developed.

One area of development which would improve the identification and use of indications is the organization of indications. Indications were not perceived by the officers as organized within a coherent structure or logical network. The lack of an adequate framework for considering events is a primary cause for the failure to develop valid perceptions of the relative frequency of events.[11] Without a logical network within which to consider events, judgments of probability tend to be based on heuristics or rules of thumb. For example, one heuristic has been termed ''availability.'' That is, the probability of occurrence of an event is assessed by the ease with which instances of the event can be recalled or imagined. The high perceived probability of occurrence of most indications, given Attack, could have resulted from the emphsis placed on Aggressor offensive operations in intelligence training rather than any underlying association between these indications and Attack. Thus, the apparent effectiveness of the 17 indications of Attack which appeared to be discriminators may be illusory.

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[11] Tversky, A., and Kahneman, D. Judgment under uncertainty: Heuristics and biases. Science, 1974, 185, 1124-1131.

A more adequate framework might be developed if indications were analyzed and organized along other dimensions in addition to alternative courses of action. One such dimensional structure might be in terms of the functions of land combat:

Command, Control and Communication
Mobility/Maneuverability
Fire Support
Combat Service Support
Intelligence

Another dimension might be in terms of the constraints placed in a military force by such factors as

Organizational Imperatives
Military Logic/Principles of War
Command Personalities
Training and Doctrine
Terrain and Weather

The specific framework within which indications should be organized is an empirical question. Methods and techniques exist, such as structural modeling[12] or the Advanced Indications Technology sponsored by the Defense Advanced Research Products Agency (ARPA), which could be used to develop both a framework for indications and improved indications.

A user-oriented structure for indications and its associated logical network of the relationships between indications would be valuable for several reasons. First, it would provide intelligence officers a mechanism for clarifying their thinking concerning indications. Second, it would provide a means for training intelligence personnel concerning indications. Third, it would provide a sound conceptual basis for developing additional indications. Fourth, it would provide the intelligence analyst a structure for the orderly and objective examination of available information. Fifth, it would provide the intelligence analayst a means of reporting progress in determining the intensity and thrust of an enemy's course of action. Finally, it would provide the collection manager an effective basis from which to adjust collection efforts as incoming information is analyzed.

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[12] Warfield, J. N. Toward interpretation of complex structural models. IEEE Transactions on Systems, Man, and Cybernetics, 1974, SMC-4, 405-417.

Another area that might improve the effectiveness of indications is the development of baseline data representing the probability of occurrence of specific indications for specific courses of action. A detailed examination of both contemporary aggressor doctrine and recent conflicts, in conjunction with activities of expert intelligence analysts, could be used to produce estimates of the probability of occurrence of specific indications for use as a baseline. The development of baseline data would be facilitated by the development of a user-oriented structure and its associated logical network describing the relationships between indications. Additionally, the development of baseline data would provide for a more detailed evaluation of both the traditional indications used in the present experiment and the indications that have been developed by other units and commands. Further, the development process could be used to validate the present findings and to evaluate aspects of indications that were not examined in the present analysis, e.g., dependencies among indications, relationships with time of occurrence, or negation of indications.

The development of tactical data systems for the Army could have a major impact on the role of indications and their use by intelligence officers. Complex networks of interrelationships among indications, as well as baseline data concerning the probability of occurrence of indications, could be easily accessible through on-line terminals. The use of mixed-initiative query and prompting techniques would reduce the detailed background knowledge the intelligence officer requires for the determination of indications and allow more time for creative intelligence analysis. The development of a computer-based on-line indications technology would thus provide increased flexibility and effectiveness in the use of indications and increase the capability of the intelligence officer to track rapidly changing battlefield activities.

CONCLUSIONS

Indications constitute a potentially powerful tool in the armamentarium of the intelligence officer. However, current indications of conventional tactical military operations are far from uniformly interpreted by intelligence officers. To the extent that the officers in the present research are representative of tactical intelligence personnel, the traditional intelligence indications are inadequate for use in contemporary tactical intelligence operations. Both analytic and empirical research is required if indications are to be a useful and effective technique in intelligence operations.

Table 1

MEAN AND RANGE OF PERCEIVED PROBABILITY OF OCCURRENCE OF STANDARD INTELLIGENCE INDICATIONS

Indications	Given Aggressor Course of Action: Attack	Defend	Delay	Withdraw
Attack				
1.* Massing of mechanized elements, tanks, artillery, and logistical support	75 (20-100)	49 (0-100)	32 (0-90)	33 (0-90)
2.* Deployment of combat elements (mechanized, armor, antitank) in echelon	73 (10-90)	43 (10-90)	38 (0-90)	30 (0-80)
3. Dispersal of tanks and SP guns to forward units	73 (20-90)	54 (0-100)	46 (10-90)	27 (2-80)
4.* Extensive artillery preparation	80 (30-100)	39 (0-100)	31 (0-80)	30 (0-90)
5.* Artillery positions well forward and concentrated	79 (20-100)	30 (0-90)	24 (0-80)	14 (0-50)
6. Medium antiaircraft guns located in forward areas	63 (20-90)	62 (10-90)	49 (10-90)	33 (10-70)
7. Forward units disposed on relatively narrow fronts	59 (10-100)	39 (0-80)	36 (0-80)	36 (0-80)

* The mean perceived probability of occurrence is significantly higher given the course of action with which the indication is doctrinally associated than given any of the remaining three courses of action.

Table 1 (continued)

Indications	Given Aggressor Course of Action: Attack	Defend	Delay	Withdraw
Attack				
8.* Concentration of mass toward either or both flanks	65 (20-95)	38 (0-70)	35 (0-90)	31 (0-70)
9. Establishment and strengthening of counterreconnaissance screen	67 (10-90)	71 (30-90)	56 (10-90)	56 (10-90)
10.* Location of enemy troops in forward assembly areas	79 (50-95)	30 (0-90)	33 (0-90)	24 (0-90)
11. Increased activity in rear areas	62 (20-90)	49 (10-90)	58 (10-95)	61 (0-90)
12.* Location of supply and evacuation installations well forward	78 (50-100)	35 (0-90)	22 (0-90)	18 (0-90)
13. Increased patrolling	73 (20-90)	50 (0-90)	43 (0-90)	33 (0-90)
14.* Increased air reconnaissance	76 (50-100)	45 (0-97)	43 (0-90)	35 (10-80)
15.* Systematic air bombardment	68 (10-100)	42 (5-90)	43 (0-90)	39 (0-90)

* The mean perceived probability of occurrence is significantly higher given the course of action with which the indication is doctrinally associated than given any of the remaining three courses of action.

Table 1 (continued)

Indications	Given Aggressor Course of Action: Attack	Defend	Delay	Withdraw
Attack				
16.* Increase in fighter aircraft over battle area	75 (30-100)	44 (10-80)	40 (10-80)	39 (10-80)
17. Increased sensor reconnaissance activity	62 (10-90)	64 (0-90)	54 (0-90)	42 (0-80)
18. Clearing lanes through obstacles within own position	73 (30-100)	30 (0-90)	43 (0-90)	51 (0-90)
19. Sudden increase in communications security measures	70 (10-90)	52 (10-95)	48 (10-91)	55 (10-90)
20.* Reconnaissance and destruction of obstacles that are part of enemy defenses	66 (10-100)	24 (0-90)	24 (0-90)	30 (0-90)
21.* Movement of additional troops toward the front	80 (30-100)	44 (0-90)	32 (0-90)	15 (0-70)

* The mean perceived probability of occurrence is significantly higher given the course of action with which the indication is doctrinally associated than given any of the remaining three courses of action.

Table 1 (continued)

Indications	Given Aggressor Course of Action: Attack	Defend	Delay	Withdraw
Attack				
22. Increased vehicle traffic toward present position.	71 (30-90)	50 (0-90)	35 (10-80)	28 (10-80)
23.* Conducting drills and rehearsals in rear areas	76 (20-95)	26 (0-90)	30 (0-80)	24 (0-80)
24. Demonstrations and feints	62 (10-90)	39 (0-90)	50 (10-92)	45 (0-90)
25.* Identification of new units in combat zone	71 (20-99)	44 (0-100)	24 (0-60)	18 (0-40)
26.* Additional command posts and supply and evacuation installations	69 (20-90)	45 (0-90)	48 (10-90)	33 (0-90)
27. Light aircraft circling over moving convoy	51 (10-90)	40 (0-80)	36 (0-90)	33 (0-70)
28.* Movement of small groups of heavily armed helicopters escorted by tactical fighters	67 (20-90)	39 (0-90)	35 (0-90)	34 (10-85)

* The mean perceived probability of occurrence is significantly higher given the course of action with which the indication is doctrinally associated than given any of the remaining three courses of action.

Table 1 (continued)

Indications	Given Aggressor Course of Action: Attack	Defend	Delay	Withdraw
Attack				
29.* Increased or unusual air activity	71 (30-90)	43 (5-80)	40 (10-80)	39 (10-78)
30. Sudden increase in communication and electronic activities	73 (40-100)	41 (0-90)	38 (10-90)	50 (10-100)
Defend				
31. Withdrawal from defensive position befcre becoming heavily engaged	30 (0-80)	27 (0-80)	66 (0-100)	75 (20-100)
32. Successive local counterattacks with limited objectives	51 (10-95)	47 (0-90)	62 (0-90)	45 (0-90)
33. Counterattacks broken off before position is restored	34 (0-80)	37 (0-90)	65 (20-90)	56 (0-98)

* The mean perceived probability of occurrence is significantly higher given the course of action with which the indication is doctrinally associated than given any of the remaining three courses of action.

Table 1 (continued)

Indications	Given Aggressor Course of Action: Attack	Defend	Delay	Withdraw
Defend				
34.* Preparation of battalion and company defensive areas	28 (0-80)	82 (20-100)	58 (10-90)	36 (10-89)
35.* Extensive preparation of field fortifications	26 (0-90)	84 (20-100)	53 (10-90)	31 (0-90)
36. Formation of antitank strongpoints	38 (0-80)	78 (40-95)	68 (40-90)	48 (10-90)
37. Preparation of alternate artillery positions	61 (10-100)	59 (10-90)	57 (0-90)	55 (10-90)
38. Preparation and occupation of successive defense lines.	28 (0-90)	68 (10-97)	79 (30-100)	67 (20-99)

* The mean perceived probability of occurrence is significantly higher given the course of action with which the indication is doctrinally associated than given any of the remaining three courses of action.

Table 1 (continued)

Indications	Given Aggressor Course of Action: Attack	Defend	Delay	Withdraw
Defend				
39. Presence of demolitions, contaminated areas, obstacles, and minefields	27 (0-80)	77 (10-100)	72 (10-90)	66 (20-90)
40. Dumping ammunition and engineer supplies and equipment and fortifying buildings	23 (0-50)	68 (0-100)	46 (10-80)	38 (0-90)
41. Entrenching and erecting bands of wire	27 (0-90)	82 (10-100)	62 (0-90)	39 (10-82)
42. Deployment of mechanized units on good defensive terrain	34 (0-80)	76 (20-100)	64 (10-90)	46 (10-90)

Table 1 (continued)

Indications	Given Aggressor Course of Action: Attack	Defend	Delay	Withdraw
Defend				
43. Employment of roving artillery	51 (10-90)	52 (0-90)	51 (0-90)	41 (10-80)
44. Attachment of additional antitank units to front-line defensive positions	46 (0-90)	74 (0-100)	62 (30-90)	38 (10-90)
45. Large tank units located in assembly areas to the rear	57 (10-95)	44 (1-90)	45 (0-90)	43 (0-90)
Delay				
46. Maximum firepower positioned forward; firing initiated at long ranges	78 (20-95)	37 (0-100)	38 (0-90)	20 (0-70)
47. Rearward movement of long-range artillery and supply echelons	17 (0-50)	55 (0-100)	63 (20-90)	80 (40-90)
48. Frontages up to four times that normally assigned to units on the defensive	44 (0-100)	43 (0-100)	55 (0-95)	43 (0-90)
Withdraw				
49. Systematic destruction of bridges, communication facilities, and other military assets in enemy territory	26 (0-90)	38 (0-100)	59 (10-90)	75 (28-100)

Table 2

FACTOR STRUCTURE OF INDICATIONS GIVEN ATTACK

No.	Indication	Factor Coefficient
	Factor I (12%)	
4	Extensive artillery preparation	.51
6	Medium antiaircraft guns located in forward areas	.68
10	Location of enemy troops in forward assembly areas	.73
12	Location of supply and evacuation installations well forward	.86
13	Increased patrolling	.52
21	Movement of additional troops toward the front	.69
22	Increased vehicle traffic toward present position	.67
25	Identification of new units in combat zone	.66
26	Additional command posts and supply and evacuation installations	.55
	Factor II (11%)	
34	Preparation of battalion and company defensive areas	.82
35	Extensive preparation of field fortifications	.76
36	Formation of antitank strongpoints	.61
38	Preparation and occupation of successive defense lines	.63
39	Presence of demolitions, contaminated areas, obstacles, and minefields	.77

Table 2 (continued)

No.	Indication	Factor Coefficient
	Factor II (11%)	
40	Dumping ammunition and engineer supplies and equipment and fortifying buildings	.63
41	Entrenching and erecting bands of wire	.82
42	Deployment of mechanized units on good defensive terrain	.81
	Factor III (6%)	
3	Dispersal of tanks and SP guns to forward units	.63
9	Establishment and strengthening of counterreconnaissance screen	.77
32	Successive local counterattacks with limited objectives	.76
46	Maximum firepower positioned forward; firing initiated at long ranges	.65
	Factor IV (5%)	
43	Employment of roving artillery	.79
48	Frontages up to four times that normally assigned to units on the defensive	.77
	Factor V (4%)	
31	Withdrawal from defensive position before becoming heavily engaged	.91

Table 2 (continued)

No.	Indication	Factor Coefficient
	Factor VI (5%)	
1	Massing of mechanized elements, tanks, artillery, and logistical support	-.55
47	Rearward movement of long-range artillery and supply echelons	.41
49	Systematic destruction of bridges, communication facilities, and other military assets in enemy territory	.80
	Factor VII (4%)	
33	Counterattacks broken off before position is restored	.39
37	Preparation of alternate artillery positions	.85
	Factor VIII (4%)	
20	Reconnaissance and destruction of obstacles that are part of enemy defenses	-.85
	Factor IX (5%)	
11	Increased activity in rear areas	.56
18	Clearing lanes through obstacles within own position	.50
30	Sudden increase in communication and electronic activities	.64
44	Attachment of additional antitank units to front-line defensive positions	-.53

Table 2 (continued)

No.	Indication	Factor Coefficient
	Factor X (5%)	
2	Deployment of combat elements (mechanized, armor, antitank) in echelon	.56
17	Increased sensor reconnaissance activity	.85
	Factor XI (4%)	
24	Demonstrations and feints	.71
45	Large tank units located in assembly areas to the rear	.70
	Factor XII (5%)	
15	Systematic air bombardment	.51
19	Sudden increase in communications security measures	.70
23	Conducting drills and rehearsals in rear areas	.65
	Factor XIII (6%)	
7	Forward units disposed on relatively narrow fronts	-.52
14	Increased air reconnaissance	.49
16	Increase in fighter aircraft over battle area	.75
27	Light aircraft circling over moving convoy	.45
29	Increased or unusual air activity	.61

Table 2 (continued)

No.	Indication	Factor Coefficient
	Factor XIV (5%)	
5	Artillery positions well forward and concentrated	.74
8	Concentration of mass toward either or both flanks	.60
28	Movement of small groups of heavily armed helicopters escorted by tactical fighters	.68

Table 3

FACTOR STRUCTURE OF INDICATIONS GIVEN DEFEND

No.	Indication	Factor Coefficient
	Factor I (14%)	
12	Location of supply and evacuation installations well forward	.57
13	Increased patrolling	.65
14	Increased air reconnaissance	.76
15	Systematic air bombardment	.76
16	Increase in fighter aircraft over battle area	.85
17	Increased sensor reconnaissance activity	.41
20	Reconnaissance and destruction of obstacles that are part of enemy defenses	.43
21	Movement of additional troops toward the front	.51

Table 3 (continued)

No.	Indication	Factor Coefficient
	Factor I (14%)	
22	Increased vehicle traffic toward present position	.50
25	Identification of new units in combat zone	.72
29	Increased or unusual air activity	.71
46	Maximum firepower positioned forward; firing initiated at long ranges	.70
	Factor II (11%)	
18	Clearing lanes through obstacles within own position	-.47
31	Withdrawal from defensive position before becoming heavily engaged	-.51
34	Preparation of battalion and company defensive areas	.72
35	Extensive preparation of field fortifications	.89
36	Formation of antitank strongpoints	.71
41	Entrenching and erecting bands of wire	.88
42	Deployment of mechanized units on good defensive terrain	.78

Table 3 (continued)

No.	Indication	Factor Coefficient
	Factor III (4%)	
6	Medium antiaircraft guns located in forward areas	-.47
8	Concentration of mass toward either or both flanks	.45
38	Preparation and occupation of successive defense lines	.77
	Factor IV (7%)	
1	Massing of mechanized elements, tanks, artillery, and logistical support	.67
2	Deployment of combat elements (mechanized, armor, antitank) in echelon	.43
4	Extensive artillery preparation	.68
37	Preparation of alternate artillery positions	.75
	Factor V (4%)	
9	Establishment and strengthening of counterreconnaissance screen	-.50
19	Sudden increase in communications security measures	.78
27	Light aircraft circling over moving convoy	.67

Table 3 (continued)

No.	Indication	Factor Coefficient
	Factor VI (4%)	
7	Forward units disposed on relatively narrow fronts	.43
40	Dumping ammunition and engineer supplies and equipment and fortifying buildings	.81
	Factor VII (4%)	
39	Presence of demolitions, contaminated areas, obstacles, and minefields	.73
48	Frontages up to four times that normally assigned to units on the defensive	-.74
	Factor VIII (4%)	
3	Dispersal of tanks and SP guns to forward units	.47
26	Additional command posts and supply and evacuation installations	-.78
	Factor IX (4%)	
28	Movement of small groups of heavily armed helicopters escorted by tactical fighters	.55
30	Sudden increase in communication and electronic activities	.55
	Factor X (5%)	
43	Employment of roving artillery	.77
49	Systematic destruction of bridges, communication facilities and other military assets in enemy territory	.71

Table 3 (continued)

No.	Indication	Factor Coefficient
	Factor XI (3%)	
24	Demonstrations and feints	-.81
	Factor XII (6%)	
5	Artillery positions well forward and concentrated	.71
10	Location of enemy troops in forward assembly areas	.55
23	Conducting drills and rehearsals in rear areas	.85
	Factor XIII (4%)	
11	Increased activity in rear areas	.80
44	Attachment of additional antitank units to front-line defensive positions	.52
45	Large tank units located in assembly areas to the rear	.50
	Factor XIV (5%)	
32	Successive local counterattacks with limited objectives	.85
33	Counterattacks broken off before position is restored	.55
47	Rearward movement of long-range artillery and supply echelons	.63

Table 4

FACTOR STRUCTURE OF INDICATIONS GIVEN DELAY

No.	Indication	Factor Coefficient
	Factor I (9%)	
1	Massing of mechanized elements, tanks, artillery, and logistical support	.66
8	Concentration of mass toward either or both flanks	.64
10	Location of enemy troops in forward assembly areas	.52
20	Reconnaissance and destruction of obstacles that are part of enemy defenses	.66
22	Increased vehicle traffic toward present position	.73
25	Identification of new units in combat zone	.76
	Factor II (6%)	
32	Successive local counterattacks with limited objectives	.64
47	Rearward movement of long-range artillery and supply echelons	.56
43	Employment of roving artillery	.79
	Factor III (7%)	
34	Preparation of battalion and company defensive areas	.63
35	Extensive preparation of field fortifications	.82
41	Entrenching and erecting bands of wire	.83

Table 4 (continued)

No.	Indication	Factor Coefficient
	Factor IV (7%)	
5	Artillery positions well forward and concentrated	.72
6	Medium antiaircraft guns located in forward areas	.45
12	Location of supply and evacuation installations well forward	.47
21	Movement of additional troops toward the front	.60
27	Light aircraft circling over moving convoy	.63
47	Rearward movement of long-range artillery and supply echelons	-.45
	Factor V (5%)	
4	Extensive artillery preparation	.56
15	Systematic air bombardment	.62
24	Demonstrations and feints	.91
33	Counterattacks broken off before position is restored	.49
38	Preparation and occupation of successive defense lines	.44
	Factor VI (5%)	
11	Increased activity in rear areas	.56
19	Sudden increase in communications security measures	.46
30	Sudden increase in communication and electronic activities	.89

Table 4 (continued)

No.	Indication	Factor Coefficient
	Factor VII (5%)	
2	Deployment of combat elements (mechanized, armor, antitank) in echelon	.75
17	Increased sensor reconnaissance activity	.78
44	Attachment of additional antitank units to front-line defensive positions	.75
	Factor VIII (5%)	
9	Establishment and strengthening of counterreconnaissance screen	-.40
31	Withdrawal from defensive position before becoming heavily engaged	.76
48	Frontages up to four times that normally assigned to units on the defensive	.66
49	Systematic destruction of bridges, communication facilities, and other military assets in enemy territory	.60
	Factor IX (4%)	
7	Forward units disposed on relatively narrow fronts	.82
17	Increased sensor reconnaissance activity	.65

Table 4 (continued)

No.	Indication	Factor Coefficient
	Factor X (4%)	
16	Increase in fighter aircraft over battle area	.69
28	Movement of small groups of heavily armed helicopters escorted by tactical fighters	.74
	Factor XI (5%)	
13	Increased patrolling	.47
23	Conducting drills and rehearsals in rear areas	.66
39	Presence of demolitions, contaminated areas, obstacles, and minefields	-.72
	Factor XII (5%)	
40	Dumping ammunition and engineer supplies and equipment and fortifying buildings	.59
42	Deployment of mechanized units on good defensive terrain	.80
45	Large tank units located in assembly areas to the rear	.40
	Factor XIII (4%)	
3	Dispersal of tanks and SP guns to forward units	.76
36	Formation of antitank strongpoints	.55

Table 4 (continued)

No.	Indication	Factor Coefficient
	Factor XIV (4%)	
26	Additional command posts and supply and evacuation installations	.88
	Factor XV (6%)	
14	Increased air reconnaissance	.88
29	Increased or unusual air activity	.54
46	Maximum firepower positioned forward; firing initiated at long ranges	.49

Table 5

FACTOR STRUCTURE OF INDICATIONS GIVEN WITHDRAW

No.	Indication	Factor Coefficient
	Factor I (7%)	
4	Extensive artillery preparation	.78
8	Concentration of mass toward either or both flanks	.39
23	Conducting drills and rehearsals in rear areas	.76
28	Movement of small groups of heavily armed helicopters escorted by tactical fighters	.60
37	Preparation of alternate artillery positions	-.54
46	Maximum firepower positioned forward; firing initiated at long ranges	.74

Table 5 (continued)

No.	Indication	Factor Coefficient
	Factor II (8%)	
34	Preparation of battalion and company defensive areas	.67
35	Extensive preparation of field fortifications	.76
40	Dumping ammunition and engineer supplies and equipment and fortifying buildings	.54
41	Entrenching and erecting bands of wire	.78
42	Deployment of mechanized units on good defensive terrain	.65
	Factor III (6%)	
12	Location of supply and evacuation installations well forward	.83
21	Movement of additional troops toward the front	.76
25	Identification of new units in combat zone	.63
	Factor IV (5%)	
16	Increase in fighter aircraft over battle area	.76
29	Increased or unusual air activity	.72

Table 5 (continued)

No.	Indication	Factor Coefficient
	Factor V (8%)	
9	Establishment and strengthening of counterreconnaissance screen	.53
11	Increased activity in rear areas	.66
14	Increased air reconnaissance	.66
15	Systematic air bombardment	.73
18	Clearing lanes through obstacles within own position	.52
24	Demonstrations and feints	.40
32	Successive local counterattacks with limited objectives	.70
33	Counterattacks broken off before position is restored	.59
	Factor VI (4%)	
26	Additional command posts and supply and evacuation installations	.48
39	Presence of demolitions, contaminated areas, obstacles, and minefields	.81
	Factor VII (6%)	
17	Increased sensor reconnaissance activity	.57
19	Sudden increase in communications security measures	.79
36	Formation of antitank strongpoints	.58

Table 5 (continued)

No.	Indication	Factor Coefficient
	Factor VIII (5%)	
13	Increased patrolling	-.49
45	Large tank units located in assembly areas to the rear	.83
	Factor IX (5%)	
3	Dispersal of tanks and SP guns to forward units	.86
44	Attachment of additional antitank units to front-line defensive positions	.72
	Factor X (6%)	
1	Massing of mechanized elements, tanks, artillery, and logistical support	.51
5	Artillery positions well forward and concentrated	.49
10	Location of enemy troops in forward assembly areas	.86
	Factor XI (5%)	
2	Deployment of combat elements (mechanized, armor, antitank) in echelon	-.40
22	Increased vehicle traffic toward present position	-.73
31	Withdrawal from defensive position before becoming heavily engaged	.88

Table 5 (continued)

No.	Indication	Factor Coefficient
	Factor XII (4%)	
30	Sudden increase in communication and electronic activities	-.78
38	Preparation and occupation of successive defense lines	.62
	Factor XIII (4%)	
20	Reconnaissance and destruction of obstacles that are part of enemy defenses	.31
47	Rearward movement of long-range artillery and supply echelons	.49
49	Systematic destruction of bridges, communication facilities, and other military assets in enemy territory	.80
	Factor XIV (4%)	
6	Medium antiaircraft guns located in forward areas	.45
27	Light aircraft circling over moving convoy	-.84
	Factor XV (5%)	
7	Forward units disposed on relatively narrow fronts	-.71
43	Employment of roving artillery	.65
48	Frontages up to four times that normally assigned to units on the defensive	.80

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